Garland (G. M.)

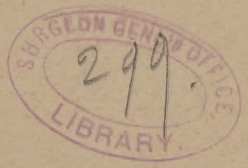
THE

LETTER S CURVE.

BY

G. M. GARLAND, M. D.,
PROFESSOR OF THORACIC DISEASES, MEDICAL DEPARTMENT,
UNIVERSITY OF VERMONT.

[*REPRINTED FROM THE NEW YORK MEDICAL JOURNAL, NOV.*, 1879.]



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THE LETTER S CURVE.

In a work designed merely to point out to students short and easy paths to rapid diagnosis, the author makes no pretension of analyzing the character or history of any symptom which he may present. He is not a critic but a stage-manager. His purpose is to arrange symptoms in tableaux, which shall symbolize by their groupings the name of the disease lurking within them. It is assumed, however, that the author of such a book has, in his own study, carefully analyzed each symptom; that he has measured it by the standard of his own experience and by the general testimony of recognized authorities; and that, therefore, the terse, concise statements, which he then makes, embody the latest and most reliable diagnostic data.

Professor Flint * has recently given us a book of this character. As we read its pages, we are impressed with its strong individuality. It is evident that the author is telling what he thinks he has felt and seen, and not merely what he has read. Without stopping to discuss the historical or polemical value of any symptom, without quoting authorities for or against his opinions, he lays down, flat and bare, what he believes and what he wishes students to accept as facts.

It is not my purpose, however, to discuss the merits of his

* Flint, "Clinical Medicine," 1879.

book as a whole, but I wish to call attention to a statement which appears on page 83, in the article upon pleurisy.

"When liquid effusion has taken place, there is dullness over an extent proportionate to the quantity of liquid, and, if this be considerable, there is flatness. If the patient be raised to the sitting posture, the dullness or flatness extends from the base upward, and the upper boundary, on either the anterior, lateral, or posterior aspect of the chest, corresponds to an horizontal line."

This statement is plain and bare, and can not be misunderstood. Professor Flint says the level of a free, non-encysted effusion in the pleural cavity is *horizontal*, when the patient's body is erect, and he proclaims this as a characteristic, distinguishing sign in the diagnosis of pleurisy. There is no hint of any possible deviation from this rule, and the student is left to infer that the portrayal of any line on the chest, other than an horizontal one, would indicate the presence, either of an encysted fluid, or of some condition entirely different from an effusion.

Now, my own experience in percussing pleuritic patients has led me to such diametrically opposite conclusions from those of Professor Flint, that I am compelled to challenge the statement which he makes. I have never yet seen a case of pleuritic effusion in which the percussion line of demarkation between the flatness of the fluid and the resonance of the lung was horizontal in any position of the patient's body. Indeed, leaving out of consideration cases of undoubted adhesions and referring only to such as have passed through the ordinary tidal phases of an acute pleuritic effusion, I have found that the line in question is far from horizontal, and presents a very instructive curve. Impressed by the wide variance between Professor Flint's views and my own, I have taken the pains to consult a number of leading authorities, and I will here present quotations from a few of them to show how far their experience coincides with my own.

Wintrich,* who was one of the first among the Germans to emphasize the percussion line of demarkation between a

* Wintrich, "Virch. Handbuch d. spec. Path. u. Ther.," Band 5, p. 254.

pleuritic effusion and a contracted lung, says: "As the exudation gradually increases, the level of the fluid does not present a line which is horizontal, or parallel to the ground, but one which descends toward the ground at a more or less acute angle."

Skoda * says: "In many, but not in all cases of pleurisy, the dullness of the percussion sound begins on the back below the shoulder-blades; as it rises higher, it stretches out to corresponding regions on the side, and even to the anterior chest-wall. In front, however, it does not reach so high as on the back."

Niemeyer † declares that "the dullness almost never reaches so high on the anterior chest-wall as on the back. . . . In other cases, and particularly where the effusion nearly fills the pleural cavity, the upper boundary of the dullness stands in front only a little lower than on the back."

Leichtenstern ‡ thinks that the fluid collects first in the most dependent portions of the pleural cavity and that the level of its upper surface is mainly determined by the position which the patient maintains during the early stages of the exudation.

1. If the patient lie continuously on his back or nearly so, the level of the fluid will be horizontal for that position. On elevating the patient, however, it will be higher behind and decline to the front. "This boundary of the exudation by a line which descends from a higher position on the back to a lower one in front is by far the most frequent, because the patient usually keeps his bed during the forming stage of the exudation."

2. If the patient walk about during the early stage, the upper level of the fluid will be horizontal.

3. If the patient lie on the affected side, then the effusion will collect in the axillary region, and will form a parabola as described by Damoiseau.

Weil § remarks that the line in question may present a

* Skoda, "Abhandlung über Perc. u. Ausc.," 6. Auflage, 1864, p. 295.

† Niemeyer, "Lehrbuch der spec. Path. u. Ther.," 1871, 8th edition.

‡ Leichtenstern, "Die Krankheiten der Pleura," 1878.

§ Weil, "Handbuch u. Atlas d. topog. Percussion," 1877, p. 136.

variety of curves. He has found it sometimes highest on the back and at other times higher in the axillary region. He declares emphatically, however, that "cases, in which the upper boundary of the exudation runs horizontally from sternum to vertebral column, I have *never* been able to observe."

Among the French authors we find Piorry * asserting that "this line is parallel to the axis of the trunk when the patient lies down, and it is perpendicular to the same when the patient stands up." On the other hand, Jaccoud † thinks that the line is highest behind and descends toward the front, with a tendency toward a parabola.

Damoiseau ‡ has described the line as forming a parabola, with its summit in the axillary region, and its branches passing downward and outward to the vertebral column and sternum.

Woillez § says "the dullness of least extent should be sought *en dehors et en arrière* of the affected side, where it forms a demi-ellipse with its convexity upward. It does not at first extend as far as the vertebral column, as Damoiseau has correctly pointed out; when the effusion grows more abundant, the line of its level becomes horizontal behind, but curves on the side so as to occupy a lower position in front."

Peter ‖ has worked out a more elaborate theory regarding the line, and says that its position depends upon the position of the patient, the form of the thorax, the action of gravity, and the nature of the exudation. Of all these causes, the nature of the exudation is the one which exerts the most influence upon the line of percussion, according to Peter; for, if the exudation be entirely *serous*, the line will be nearly horizontal for all positions of the body.

If the exudation be entirely *fibrinous*, it will adapt itself

* Piorry, "Traité de Plessimétrisme et d'Organographisme," 1866, p. 304.

† Jaccoud, "Traité de Pathologie Interne," 1875, tome ii., p. 147.

‡ Damoiseau, "Recherches Cliniques sur plusieurs Points du Diagnostic des Épanchements Pleuritiques." Extrait des "Archives générales de médecine," 1844.

§ Woillez, "Dictionnaire de Diagnostic Médical," 1870, p. 839.

‖ Peter, "Leçons de Clinique Médical."

slowly to changes in the position of the patient, and the line of flatness will be more parabolic in shape.

If the exudation be *sero-fibrinous*, it will gravitate so slowly on change of position that one will find two zones of dullness: (*a*) a superior zone of superficial dullness, due to the thick fibrinous exudation which clings to the walls of the chest; (*b*) an inferior zone of profound and absolute dullness, caused by the serous exudation which gravitates downward.

Of the English authors, Anstie * says that the dullness increases from below upward, "but the line of its termination above is by no means always an evenly horizontal one."

Gee † inclines to the opinion that the shape of the line depends upon the position maintained by the patient early in the disease, and thus practically accepts the views of Leichtenstern and Ferber. ‡ Speaking of the stage of absorption, he says: "The upper surface of the liquid, when it reaches as high as two inches above the nipple, is horizontal; when lower than this point, the dullness forms irregular parabolic curves, which become smaller and smaller, and, last of all, disappear at the lowest part of the thorax."

On consulting American authors, we find a curve described by Professor Calvin Ellis, § of Boston, which is radically different from any hitherto mentioned. This curve, which is represented diagrammatically in Fig. 1, begins with medium effusion relatively low down on the back. Passing outward from the vertebral column, it soon turns upward and proceeds obliquely across the back to the axillary region, where it reaches its highest point. Thence it advances in a straight line, but with a slight descent, to the sternum. It will be noticed that the peculiar shape of this curve on the back gives it a strong resemblance to an italic letter *S*, and therefore I have named it the "letter *S* curve" of pleurisy. According to my experience, it may be traced by proper percussion in every case of free, uncomplicated pleurisy, when the patient's body is erect,

* Anstie, Reynolds's "System of Medicine," vol. iii.

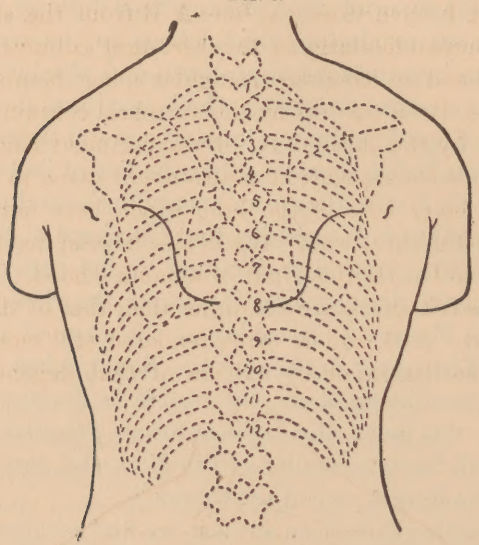
† Gee, "Auscultation and Percussion," 1877, p. 225.

‡ Ferber, "Die phys. Symptome der Pleuritis Exsudativa," 1875.

§ Ellis, "Boston Medical and Surgical Journal," January 1, 1874. Ibid., December 14, 1876.

and the amount of fluid present is not excessive. As an effusion increases in amount the curve gradually rises and tends to flatten out, so that it no longer presents its characteristic *S*

Fig. 1.



feature after it reaches the second rib. At this point, when the fluid occupies nearly the entire side, the curve comes quite near to the horizontal; but if some of the fluid be withdrawn by aspiration or by absorption, the letter *S* curve will reappear and retreat downward in the inverse order of its advance, until with entire absorption it becomes merged into the normal boundary of the lung. Professor Ellis tells me that, since he discovered this curve and had his attention thereby strongly attracted to the subject, he has never been able to detect any other with acute pleurisy.

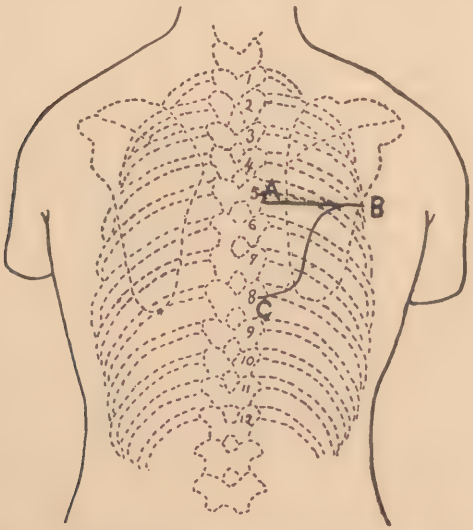
Moreover, I am pleased to add further evidence upon this matter from independent observers in Germany. Dr. Heitler,* of Vienna, has noticed that the area of pulmonary resonance, as contrasted with the flatness of the effusion, extends lower on the back than it does on the side. This area of per-

* Heitler, "Wien. med. Wochenschrift," No. 52, 1878.

sistent resonance is bounded on one side by fluid flatness, and on the other by the vertebral column, so that it forms a rude triangular space, which Dr. Heitler likens to the half of a monk's hood cut longitudinally.

In Fig. 2 I have drawn a line A B from the summit of the curve perpendicularly to the vertebral column. I have thereby inclosed an irregular triangular space, bounded above by the line A B, on the left by the vertebral column A C, and on the right by the curve C B. By experiment I have found that this space corresponds in position and shape to the lower part of the lower lobe of the lung which here lies in direct apposition to the chest-wall. It will also be seen that this space corresponds to Dr. Heitler's half of a monk's hood. The resonance of this triangle is always duller than that of the portion of lung above A B, and is often rendered still more dull by inefficient ventilation, or by œdema of that dependent part

Fig. 2.



of the lung. I have termed it, therefore, the "dull triangle," and I warn all who seek to trace the true line of pleuritic flatness to be careful not to overlook this region.

Dr. Ottomar Rosenbach,* of Breslau, has apparently dis-

* Rosenbach, "Berl. klin. Wochenschrift," No. 12 1878.

covered the same dull triangle without recognizing its true shape. He has recently published an article in which he calls attention to a new sign which he considers characteristic of pleurisy as distinguished from pneumonia. He says if you percuss a pleuritic patient immediately after the latter arises from a reclining posture, the back will appear very dull as high as the spine of the scapula. If the patient be then allowed to walk about the room and breathe deeply for a few minutes, there will be found a remarkable clearing up of the percussion sound for a considerable area on the back, and down as far as the angle of the scapula. It is self-evident that that phenomenon referred to by Rosenbach is none other than a clearing up of the percussion sound of the dull triangle, although, as I have said, he failed to trace the boundaries of the same.

I have thus given a summing up of the experience of a number of observers regarding the position and shape of the line in dispute; and while they differ from each other in many points, we find that, with one exception (Piorry), they are unanimous in the opinion that a *horizontal level is not* characteristic of pleuritic effusion.

Some of them (Ferber, Leichtenstern) allow that the line may be horizontal under certain conditions, but they modify their concession by asserting that such conditions are exceptional, and that the line as a rule is oblique.

On the other hand, several of them (Wintrich, Fraentzel, Weil, Ellis) say that the line is *never* horizontal.

Although the accumulation of all this adverse testimony does not prove that Professor Flint is wrong in stating the line to be horizontal, yet I present these quotations in the hope that a full agitation of the subject may lead to a more careful and more critical investigation of the curve by American physicians.

I believe myself that the letter *S* curve is the only true characteristic curve of the ordinary non-encysted effusions of acute pleurisy, and I have endeavored, in my work on "Pneumono-Dynamics," * to demonstrate by simple laws of physics

* Garland, "Pneumono-Dynamics," 1878.

and by actual experiments, that this curve is the only one possible under the physical laws which obtain in the chest. Moreover, I am continually receiving testimony from other physicians to the effect that they find the letter *S* curve to be the rule in their own experience since their attention was called to the subject.

In closing, I will add a few words of caution regarding the manner of searching for this curve. Nearly all teachers advise students to compare opposite sides of the chest in percussing pleuritic patients. This advice is excellent to start with, but when the student wishes to trace the curve he must confine his attention *absolutely* to the side involved. He is seeking the line of demarkation between the dullness of a partially collapsed lung and the flatness of a fluid, and therefore he must not confuse his ear by the full resonance of the well side. He must also proceed in perpendicular lines from above downward, and must percuss lightly. Oftentimes one may obscure the true line by percussing hard, and thus producing a strong transmission of resonance from the lung above. The experience of Rosenbach should also be borne in mind, and one should never try to define the size of an effusion immediately after the patient has risen from a reclining posture. If possible, the patient should be allowed to walk about, or at least to breathe deeply for a few times, in order that the lower portion of the lung may be well ventilated before percussion is attempted.

HEALTH,

AND

HOW TO PROMOTE IT.

BY

RICHARD McSHERRY, M. D.,

PROFESSOR OF PRINCIPLES AND PRACTICE OF MEDICINE, UNIVERSITY OF MARYLAND; MEMBER OF AMERICAN MEDICAL ASSOCIATION; PRESIDENT OF BALTIMORE ACADEMY OF MEDICINE.

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